DOCUMENT RESUME

ED 288 836 SP 029 581

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TITLE Preparation for Teaching. A Manual with Exercises in Curriculum Development.
INSTITUTION Peace Corps, Washington, DC. Information Collection and Exchange Div.
PUB DATE Dec 85
NOTE 53p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Course Content; *Curriculum Development; Higher Education; Industrial Arts; *Industrial Education; Lesson Plans; *Preservice Teacher Education; *Program Development; Staff Development

ABSTRACT

The purpose of this manual is to provide a technique to help teachers better prepare for a teaching career in industrial education. Specifically, this manual, including the exercises, was developed to be used in weekly seminars for students enrolled in the St. Vincent Teachers' College (West Indies). It may also be used for staff development on an individual basis and serve as a pilot program for those preparing to teach in multi-vocational centers in St. Vincent. The manual provides a process through which the teacher can prepare for a teaching career by focusing on curriculum development in the area of industrial education. Along with basic information, a series of exercises are presented that involve contact with representatives of local business and industry and teacher trainers, as well as the study of journals and reference materials that may be available. Sections include an overview of curriculum development, an outline of the course of study, development of lesson plans, project selection in industrial arts, and a checklist for program improvement. A brief bibliography is included. (JD)

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PREPARATION FOR TEACHING

A MANUAL WITH EXERCISES IN CURRICULUM DEVELOPMENT

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St. Vincent, West Indies
June 1985

Peace Corps
Information Collection and Exchange
December 1985

INTRODUCTORY STATEMENT

This manual, including the exercises, has been developed for and used in the following situations.

1. Weekly seminars for students enrolled in the St. Vincent Teachers' College who are preparing to teach Industrial Education subjects.

2. Staff development on an individual basis at the St. Vincent Technical College.

3. A pilot program in teacher training for those preparing to teach in multi-vocational centers in St. Vincent.

It is essential that the user of the manual take into consideration the background (previous experience, formal or informal study, etc.) of each learner and add to, delete from, or otherwise clarify the process of curriculum development.

The author is grateful for the opportunity to work with the above named groups in the development of this manual.

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St. Vincent, West Indies

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PURPOSE OF THE MANUAL

The purpose of this manual is to provide a technique--a process through which the teacher can better prepare for a teaching career. It is not intended to be a "recipe" book for teaching on a day to day basis, nor is it intended to be all inclusive of every aspect of teaching. It is intended as a focus on curriculum development in the area of Industrial Education. As such it is part of the preparation for the teaching process.

The manual includes basic information and a series of exercises, each of which requires the active involvement of the teacher-learner. That involvement includes contact with representatives of local business and industry, teacher trainers, as well as the study of such journals and reference material that are available. Through this kind of involvement it is expected that the teacher will explore new ideas and come to a better understanding of the curriculum development process as part of preparation for teaching.

This manual may be used in several ways; the most common ways will be, for example:

1. by a Peace Corps Volunteer assigned to work in staff development in technical, vocational, or industrial education at a teachers' college, a technical school, or a secondary school.
2. by a local teacher trainer or educator responsible for staff development.
3. by an individual teacher, preferably under the guidance of an experienced teacher.

It is expected and highly recommended that any individual using

this material will, for clarification and understanding of the curriculum development process, add additional relevant information.

The manual includes the following sections:

1. Preparation for Teaching
2. A Schematic Overview of Curriculum Development
3. Developing a Set of Beliefs About Education
4. The Course of Study
5. Sample Unit Plan
6. Developing a Lesson Plan
7. Project Selection in Industrial Arts
8. Program Improvement--A Check Sheet
9. Bibliography

PREPARATION FOR TEACHING

The word "preparation," as you already know, means or includes action. The act of preparing to teach means getting ready for teaching. For the purposes of this discussion two aspects of the word preparation are extremely important. These are:

1. to make oneself ready
2. to put things in readiness

To make oneself ready, but for what? To put things in readiness, but for what? To be truly meaningful the wording must be amended to read as follows:

1. to make oneself ready TO TEACH
2. to put things in readiness FOR TEACHING

The added phrases "to teach" and "for teaching" narrow the definition and in so doing move from the general to the specific. It now says, "I must make myself ready to teach" and "I must have all resources, aids, materials, course of study, lesson plans, and my attitude in readiness for teaching." It simply means that I, the teacher, am the one who must take the action necessary to be ready to teach.

The career of a teacher--an educator--encompasses three main phases. These are:

1. learning
2. learning and doing
3. learning, doing, and improving

By way of clarification, the learning phase begins well before formal teacher training and extends beyond that time; however, in

the context of this manual, learning about teaching begins with the teacher education or training programmes. Learning includes, but is not limited to:

1. development of an active, personal philosophy of education
2. development of vocational, industrial, and business skills
3. development of knowledge and understanding of the way in which students learn
4. knowledge of teaching techniques
5. development of courses of study and lesson plans
6. knowledge of safe industrial practices
7. development of functional, efficient learning laboratories
8. understanding the relationships between subjects
9. knowledge of the national need for trained manpower
10. knowledge of job opportunities for students
11. knowledge of opportunities for students to acquire additional training.

The learning and doing phase includes practice teaching and the teaching which follows training. Doing is teaching. It is a time for putting theory into practice or beliefs into action. The practical questions to be answered are, "Does my theory work?" and "Do my beliefs about my subject really meet the needs of students, of industry and of the nation?" Learning is still an integral part of phase two. Now that you, the teacher, have your own shop, laboratory or classroom in which to teach you begin to try out (test-examine) what you have learned about teaching. For example, you will be:

1. planning lessons
2. trying out teaching techniques

3. serving as a role model for students
4. motivating students
5. selecting projects to be used as vehicles for instruction
6. involved in staff and community relationships
7. concerned about personal and professional growth as a professional teacher.

This is the time to re-evaluate the set of beliefs about education which you prepared during the learning phase. Check them out. Study each one carefully. Ask yourself, "Is there a relationship between what I believe and what I am teaching?" Phase two is a time for getting your act together as a teacher. It is the beginning of many years of trying out new ideas, techniques, and materials. Even though it may be a time of uncertainty do not overlook the fact that it is a time of learning.

Learning, doing, and improving, phase three, moves into the long range, career aspect of teaching. It is a time when the teacher begins to develop as a truly professional educator. It implies, as a professional responsibility, even greater attention to learning. It is impossible to give students the best education if one ceases to learn, relying only on what was learned 5, 10, 20, or even 30 years ago. Think about it. It is a time to:

1. review and revise (update) your personal philosophy of education
2. reexamine the needs of industry
3. study the latest industrial processes and technological advances
4. determine the kinds of skills students will need to enter the job market

5. decide on ways to incorporate those skills into the course of study

6. discard all out-of-date, out-moded, and valueless parts of the course of study

7. build into the course of study training that goes beyond the minimum requirements of a syllabus or other external guidelines

8. decide to grow as a professional teacher

   -join a professional teachers (vocational) organization like AVA, AIAA, Caribbean Industrial Education Association, Business Education Association, Home Economics Association, or other professional organizations

   -form a local group for the study of teaching in a particular subject

   -continue to study and add to your personal professional library

   -subscribe to journals in your field of interest

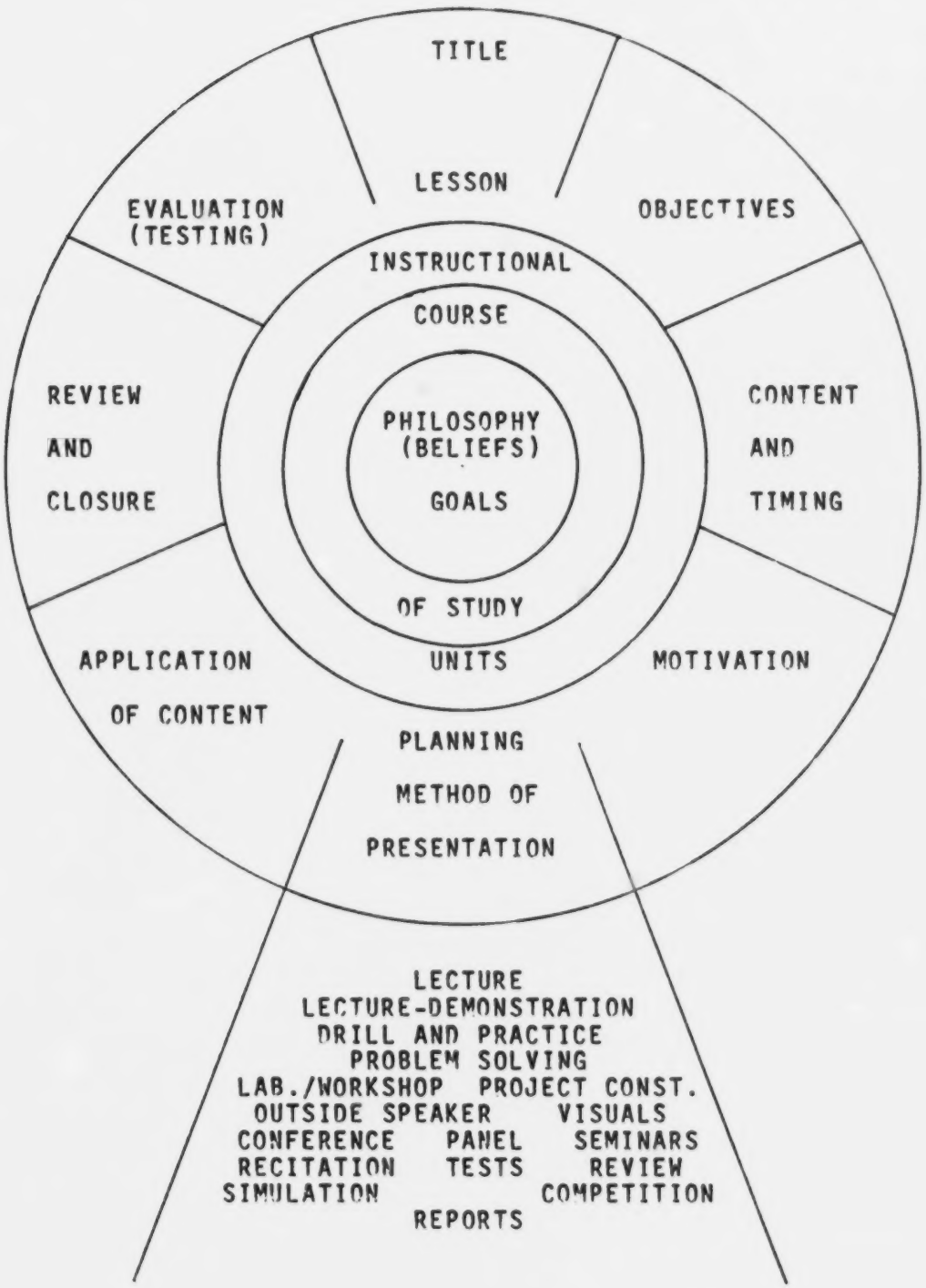
9. decide to strengthen school-industry-community ties

10. decide to teach to strengthen the problem solving abilities of students

11. decide to develop the concept of inter-relatedness of subjects.

12. decide to put into action a plan for maintenance and repair of tools and equipment.

A final word on preparation for teaching--there is an unlimited potential for learning and for improvement of instruction. Until each teacher has used every available means or resource the potential remains "unlimited." Too often we, as educators, set our own limits and set them far short of that which is possible within the present set of circumstances. Think about it.



SCHEMATIC OVERVIEW OF CURRICULUM DEVELOPMENT

At the center of the Schematic Overview of Curriculum Development is a set of personal beliefs derived from a study of education and learning principles, manpower needs of industry, stated national goals, and student needs. These, then, lead outward through the development of a course of study, its division into units of instruction, the daily lesson plan, and culminate with the presentation (teaching) of the lesson.

For clarification of the schematic, the section "Method of Presentation" has been expanded to provide an indication of the kind of detail possible for most of the lesson planning segments.

Exercises:

1. Study the schematic to become familiar with it and with the terminology.
2. Write a definition of each of the terms found within the circles.

DEVELOPING A SET OF BELIEFS ABOUT EDUCATION

Each person who is preparing to teach must formulate a set of beliefs, a personal philosophy about teaching. This set of beliefs encompasses education as a whole, including, for this exercise, the important Industrial Education programme.

That which a lecturer or teacher professes to believe about education must relate to economic, social, governmental, and other conditions found in the nation and, in addition, must relate to what is known about the ways in which students learn. In preparing a personal set of beliefs, the teacher examines in his/her own mind the whole of education as well as the various parts of education. This kind of examination is done in the context of the conditions mentioned above in order to provide the best possible education for students.

The purpose of this exercise is to provide you with a process for organizing your beliefs and for getting them written. Specifically, it is to help you develop a personal philosophy of Industrial Education that will lead to action (teaching) and finally to learning.

PHILOSOPHY (Beliefs) ---------- ACTION (Teaching) ---------- LEARNING (Achievement)

Note the importance of going beyond the development of a set of statements of philosophy. If philosophy (beliefs) does not lead to positive action, little, if anything, is gained.

Action, as used in this exercise, includes more than the act of teaching. Course construction, student evaluation, shop organi-

zation, parent and community contact, and other aspects of education are all part of the ACTION.

In reviewing these statements the basic question is, "Does my active personal philosophy provide for the needs of students and for the needs of the nation now and in the foreseeable future?" Some of the statements may have to be altered, updated, or even discarded if the set of statements is to be of value. This process provides for a growing and active personal philosophy of Education and of Industrial Education. These statements are your personal guide for action.

The philosophy statements must be written. Only with a written statement can one examine beliefs systematically, be precise and exact, have a set of statements for re-examination and updating, compare one statement with another for consistency, and have a basis for the writing of action statements. Included with this exercise are sample worksheets.

The following information is included to assist you in the formulation of your growing active personal set of philosophy statements. These are not sets of individual statements, but are the result of any number of personal statements. They are a composite of what others believe and are statements of a larger group or organization. Read each one carefully. You will find many ideas for your personal set of beliefs.

The governments of many Caribbean nations have recognized the importance of creating many new jobs for their citizens. This means

the building up of a skilled labour force: craftsmen, technicians, engineers and others, all of whom should be a product of the local and regional education scheme. The Caribbean Examination Council (CXC) has developed an Industrial Arts Syllabus which includes the rationale for Industrial Arts Programmes. It recognizes that Industrial Arts is the first level of preparation in an Industrial Education Programme, which includes technical and vocational education.

The CXC has identified 3 major facets of student performance.

1. Knowledge: Recall of facts, terms, methods, procedures and principles.
2. Understanding: Interpretation and use of concepts and principles in identifying and solving problems.
3. Practical Ability: Ability to carry through problem solutions, demonstrating an acceptable level of acquired skill.

The Industrial Arts Curriculum Planning Guide (Oregon and Washington Curriculum Development Consortium) defines Industrial Arts as follows: "Industrial Arts is a study of the many aspects of industry and technology including consumer,the technical, occupational, managerial and cultural. Industrial Arts is a study of tools, materials and processes found in a technological society. Industrial Arts helps students to gain technical knowledge and competencies through carefully selected experiences in planning and designing, constructing, evaluating, and using tools, equipment, materials and processes of industry."

Vocational Industrial Arts is relatively new to the Industrial

Education structure. The Vocational Industrial Arts Program Guide of the Spokane Public Schools, (Spokane, Washington, USA) defines Vocational Industrial Arts as follows:

"Vocational Industrial Arts differs from General Industrial Arts in that it places heavier emphasis on career selection and vocational orientation. Students gain insight into skill requirements (of trades and technical jobs), working conditions, and other factors related to various careers within an occupational cluster. Vocational Industrial Arts closely relates the tool-using skills learned in General Industrial Arts to the tool-using skills necessary for success in a trade or technical job."

A philosophy statement from outside the industrial area is included to provide additional clues for you in developing your personal philosophy statements. It is a statement from another vocational area or programme. The Home Economics Program Guide of the Spokane Public Schools, (Spokane, Washington, USA), has a statement which reads as follows:

"The focus of the Home Economics program is to assist all students in the development of attitudes, understandings, and abilities for achieving satisfying personal and family living, for preparing to manage a home, for attaining entry-level skills for employment, and/or for pursuing advanced training in the field. In order for classroom learning to be most effective, practical application should occur outside the classroom. Communication involving home, school and community is an essential element of the program."

John Dewey, an educational philospher, advocated "learning by doing." In other words, if a student is to become skilled in wood-working, that student had better work with wood during the learning process and use the tools and equipment of the wood-working industry. During the time the student is working with the materials, tools and equipment the instructor must give the necessary demonstrations and instruction. Imagine trying to prepare a soccer team for competition by merely reading and lecturing about soccer. The result would be disastrous. The preparation of a skilled mechanic involves simultaneous learning and doing of no less intensity than that which prepares a soccer player for competition.

From what you have already learned about teaching, the needs of students and the needs of the nation from the statements above and from other sources, you should have several ideas to bring into your personal philosophy of education.

Step 1 in this exercise is to make a list of the items you think important enough to have a personal belief about and which you can translate into action. A sample worksheet is included.

Step 2 is to begin putting down action statements for each philosophy statement. See the second sample worksheet which will indicate the way of writing both a philosophy statement and the action statement. NOTE: Before writing the action statement(s) check that statement of belief against the following criteria:

1. Are your statements exact? Would anyone else, when reading your statements, know exactly what it is you

believe about an item? Simple, to the point, statements are best.

2. Is your set of statements comprehensive?

3. Can a definite action statement follow?

4. Are your beliefs up-to-date? What is the current thinking in your field?

5. Can you apply your beliefs to your field of (subject) of teaching?

6. Will your beliefs about any area of teaching--evaluation, for example--help you to improve your instructional practices?

Rephrase the statements where necessary and proceed with the action statements.

I believe the topics I have listed below are important enough for me to make a personal statement of my philosophy (beliefs) about each of them.

1.
2.
3.
4.
5.
6.
7.
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9.
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12.
13.
14.
15.
16.
17.
18.
19.
20.

Twenty is not a magic number; you may have more or less items in your set of beliefs. When you have made the list, review it and select the key areas.

MY BELIEFS ABOUT EDUCATION AND INDUSTRIAL EDUCATION	IN MY TEACHING I WILL TAKE THESE ACTIONS
I believe students should learn to use tools in a correct and safe manner.	I will, when using tools, use them correctly and safely. I will demonstrate the correct and safe use of tools.
I believe a knowledge of math is important in the study of Industrial Education.	I will use examples of the use of math in teaching Industrial Arts. I will have my students solve practical Industrial Arts related problems using math. I will encourage math teachers to use examples from Industrial Arts in their teaching.
I believe....	

THE COURSE OF STUDY

The development of a course of study is part of the planning for an instruction process. It is a major undertaking. It is an on-going process, one in which the professional teacher must be involved. The rapid increase in technology and knowledge, new industries, and the phasing out or phasing in of jobs make it mandatory that the course of study be well thought through and that it be kept current. A course of study may also be called a program guide or curriculum guide.

Not every teacher of Industrial Education subjects will be required to develop a course of study. Instead, a teacher may be given a syllabus containing the major units of instruction and objectives of the course, plus other pertinent information. The Industrial Arts syllabus prepared by the Caribbean Examination Council for use in nations located in the Caribbean area is an excellent example of a syllabus prepared for teacher use. It is, however, important that each teacher know the process of course of study development so that she/he can analyze the syllabus in relation to that which best meets the needs of the students.

The course of study is the official guide/outline for a particular course. It provides the structure of the course. It provides the objectives and the content which must be taught. In the area of Industrial Education the course of study may be designed for Industrial Arts, Vocational Industrial Arts, or Trade and Industrial Education courses.

The basic differences between the three types of Industrial Education are in the emphasis placed on learning skills necessary for entry level employment, career exploration, or general industrial knowledge. A brief definition of each type follows.

Industrial Arts is a study of tools, materials, and processes found in the industries of a nation or region. It is a study of the many aspects of industry and technology, including its consumer, technical, occupational, managerial and cultural aspects. Industrial Arts helps students gain a technical knowledge and competency through carefully selected experiences in planning and designing, constructing, evaluating, and using tools, equipment and materials found in industry.

Vocational Industrial Arts is Industrial Arts taught with the added emphasis on the career possibilities of a given subject (woods, metals, etc.) and to prepare students for entry into Trade and Industrial Education classes.

Trade and Industrial Education is vocational education which is designed to develop manipulative skills and safe practices, provide technical knowledge and related information, and to prepare students for entry into industrial occupations.

The course of study has been described as "the official guide or outline for a particular course." There are certain values in having a course of study that need to be emphasized. Some of them are listed below. The course of study:

1. is the basis for all learning activity taking place in the shop, laboratory or classroom;

2. describes in broad terms a specific course or program and in so doing sets certain limits on the content;
3. provides the general objectives of the course;
4. provides an overview of the content (subject matter);
5. identifies the resources necessary to meet the objectives;
6. identifies the end product (student learning);
7. provides information for students, school administrators and the community.

TYPICAL FORMAT OF A COURSE OF STUDY

The purpose of this section is to provide a sample format of a course of study and to provide an opportunity to write portions of a course of study.

There is not total agreement among educators as to how detailed a course of study must be. There are those who prefer a very short document with only the important areas listed and with key points included under each area. Others, particularly in places where there are few educational resources available, will need to place a great amount of information in the course of study. The CXC Industrial Arts Syllabus is an example of a detailed course of study. There is, however, general agreement that the following items should be included in the course of study:

1. Course title
2. Course description
3. Course objectives
4. Identification of contents
5. Sequencing and timing

1. Course title

The title is the way in which the course will be identified. It is the official designation which, when placed on a student's record, indicates the performance of that student in the course. It is important that the title be an accurate designation of the course. It should be kept short and have appeal to students.

2. Course description

A course description is one of the first steps in the development of a course of study. It is used to set the limits within which objectives and content will be developed. When the writer has completed writing the objectives and has developed the content, the course description should be reviewed and reworded as needed.

The example which follows will be helpful in writing your course description. It contains only three short paragraphs.

Paragraph 1 contains the title, length of the course, grade level of the students, purpose of the course, and the employment level upon completion of the course.

> The Vocational Small Engine Repair course is a 3 term, 360 hour course for 12th grade students and is designed to prepare them for employment as small engine mechanics in the small engine repair and maintenance field at a job-entry level.

Paragraph 2 contains information as to whom will be taught, the skills, knowledge and attitudes to be taught, and where the instruction will take place.

> The student will be taught the safe use of hand and power tools of the trade, trouble-shooting techniques, repair and

maintenance skills, and basic business skills. Emphasis will be placed throughout the course on attitude development. The intsruction will take place in the school shops, laboratoratories, classrooms, and through on-the-job training (attachments).

Paragraph 3 contains the source of data, adaptation to local needs processes, and individuals involved in the process.

> The content of the course is gathered from business, industry, labour, related printed materials, examination and licensing requirements and is adapted to local needs via the combined judgement of the instructor, administrator, and the craft advisory committee.

The preceding three short paragraphs are a sample of a course description for a Small Engine Repair course taught in a Vocational Trade and Industrial Education program. It represents one way of writing a course description. It is complete and concise and provides a quick overview of the course and the direction the instructor will take. It also provides good information to be used in publicizing the course to parents, students, and the business and industrial community.

Exercise:

1. Select an industrial course you are teaching, one you might be teaching, or one you would like to teach.
2. Write a brief 3 paragraph description of the course.
3. Write a title for the course.

3. Course objectives

The writing of course objectives is a necessary part of the process of developing a course of study. The objectives placed in the course of study are general. They focus on the overall outcome or competency expected of the students upon completion of

the course. Specific behavioral or performance objectives are considered to be part of the lesson plans. The general course objectives are guides for the instructor. They provide the framework within which the specific learning outcomes are defined in lesson plans.

For explanation and clarification two examples are provided for examination.[2] The first example is taken from the CXC Syllabus. The objectives in this example are written for a specific course in Industrial Education. The second example is taken from a Trade and Industrial Education Program Guide.[2] The objectives in this example are written for all courses taught within the Trade and Industrial Education area. It is understood that the instructor will apply the objectives to the specific course being taught.

Example Number 1

Syllabus for Examination in General Electricity (CXC)

General Objectives

1. To develop skill in the use of devices associated with general electricity.
2. To provide experiences which will enable students to know that control elements, secure connections and safety devices are necessary in the field of electricity.

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1. Industrial Arts Syllabus (CXC 12/0/SYLL 80), Caribbean Examination Council, 1980, p. 3.
2. Trade and Industrial Education Curriculum Guide, Vocational Education Department, Spokane Public Schools, Spokane , WA, USA, pp. 1 & 2.

3. To stimulate interest in, and increase knowledge of, electrical design.

4. To develop the best possible safety practices and procedures.

5. To make students aware of the scope of careers open to them in the field of electricity.

Example Number 2

Trade and Industrial Education Curriculum Guide (Spokane Public Schools)

Goals of Trade and Industrial Education

1. Skill and Knowledge

   To develop entry-level job skills and acquire the knowledge necessary for successful work in an occupational area of the student's choice.

2. Attitude

   To develop attitudes essential for successful work and occupational progress in trade and industry.

3. Career

   To acquire an adequate and informationally sound, as well as experiental, base from which to make career decisions regarding occupations in trade and industry.

4. Mobility-Adaptability-Retraining

   To develop an understanding of the need of, and the capacity for, occupational mobility, to help students to adapt to new situations, and to see the need for additional training or retraining in trade and industrial technology.

Exercise:

1. Review the course description and title already prepared.

2. Write at least 5 general course objectives for the course.

4. Content

The content section will make the major portion of the course of

study. This is the section which contains a detailed listing of the skills and knowledge to be taught during the course. A content section should not be as brief as a simple listing of the units to be taught. It is strongly recommended that it contain at least the following sections.

1. The major instructional units of the course
2. An outline of the content of each unit
   a. Objective(s) for each unit
   b. Iisting of tasks/lessons/skills to be taught
   c. Identification of relevant information
   d. Safety precautions or procedures
3. An identification of special situations or needs
   a. Special presenters, speakers, etc.
   b. Field trips
   c. Special teaching aids
   d. Special Equipment setup.
   e. Anything out of the routine necessary for instruction.
4. Identification of resources.
5. A list of test equipment, hand tools, equipment and accessories.
6. A list of materials and supplies
7. An estimate of the time required to teach each unit.

Following is an example of a course in carpentry which has been broken down into units of instruction.[3]

1. Orientation

---

3. Develop a Course of Study, Module A-8, The National Center for Research in Vocational Education, Ohio State University, Columbus, Ohio, 1978, p. 34.

2. Care and Use of Tools
3. Forms and Foundations
4. Wall and Floor Framing
5. Roof Framing
6. Cornice and Exterior Trim
7. Roofing
8. Interior Trim
9. Cabinet Work
10. Stair Construction
11. Review and Evaluation

This course content is taken from a carpentry course taught in a Trade and Industrial Vocational Education program in the United States. These are the major instructional units. Each unit must be divided into a listing of performances or tasks to be learned within the unit heading. Under Unit 2, Care and Use of Tools, the basic carpentry tools must be introduced and taught to the learner. What they are, how they are used, where and under what conditions each is used, how tools are maintained, sharpened and repaired, safety in tool usage, how to judge and purchase quality tools, and special power tool usage are some of the lessons found in Unit 2. These form the basis for lesson plans.

Include with each unit the objective(s) for the unit. In Unit 2, what is it that the student is expected to be able to do with the tools of the carpentry trade? What is the student expected to know about tools?

The source of curriculum content is a constant concern of the

course of study developer. If a syllabus has been provided the problem has been solved--with one exception; the instructor must evaluate the syllabus and the content. There are sources of curriculum content to be considered, whether the task is to prepare a new course of study or to evaluate an existing one. Not every source listed below will be beneficial in every situation. The important thing is to check them out and use those that are relevant. Within each of the sources listed is either an indication of the kind of information to expect or the sources of information to be found within the main heading. Sources of curriculum data are:

1. Developed Resources
   a. published texts
   b. manuals
   c. trade journals and industry reports
   d. craft publications
   e. syllabuses
   f. professional journals
   g. educational reports and research
2. Business, Industry and Labour
   a. skills requirements of local trades/occupations
   b. theoretical and practical information requirements
   c. industry standards
   d. work attitudes expected by employers
   e. kinds of locally made craft products
   f. forecasts of the future of the trade or craft
3. Examination and Licensing
   (Requirements & standards for passing exams or receiving licenses)

a. scope of licensing requirements

b. established standards of performance and/or knowledge

c. examples--City and Guilds of London, CXC, Pitman's

4. Judgemental

a. instructor evaluation of skills requirements

b. advisory committee recommendations

c. recommendations of individual craftsmen and merchants

d. selection of content by the instructor, in relation to time available for teaching

e. evaluation of the background and capability of the students.

The sources listed above will provide a large quantity and variety of material. Some will be unusable for the reason that they are too advanced or out of date, or for some other reason. Most will be of some value, however. When the material is gathered it must be grouped into units of related material. Discard that which is not relevant to the course of study.

Exercise:

1. Prepare the content section for the course for which the course description and objectives were prepared. Note the steps beginning with number 2.

2. Gather the data.

3. Organize the data into instructional units. Refer to pages 31-32.

4. Divide at least one unit into the relevant tasks or performances to be taught (Lesson plan topics).

5. Include objectives for each unit.

6. Prepare the lists of tools, equipment, supplies and materials.

7. Review and revise as necessary.

5. Sequencing and Timing

The ideal condition occurs when the amount of content to be taught and the time required to teach the content exactly match the amount of time available for teaching. It rarely happens that way--so do not be alarmed when you find that there is not sufficient time to teach all of the content you have identified as important to the course. It will be necessary to be selective in choosing the instructional content, just as it will be very important to be efficient in the teaching process. It will be helpful to prepare a chart in which the instructional units are listed. Following, or alongside, each unit place an estimate of the time required for teaching each unit.

The rationale for sequencing and timing is:

1. to ensure that each new learning experience builds upon knowledge and previous experiences;
2. to ensure that the swquence of operations follows an industrial pattern for skills being taught;
3. to ensure an adequate amount of time for instruction;
4. to ensure an adequate amount of time for student learning activities.

The example of the carpentry course used in the content section can be used to illustrate sequencing and timing. Notice the listing of instructional areas (units). The units are already sequenced in the manner in which a house is constructed, beginning with introductory units then moving from foundation and forming instructions on through the major steps in house construction and completion. An example of timing for a two year

course follows.[4]

Instructional Areas (Units)	Year 1	Year 2	Totals
1. Orientation	15	15	30
2. Care and Use of Tools	60	25	85
3. Forms and Foundations	120	30	150
4. Wall and Floor Framing	200	25	225
5. Roof Framing	120	15	135
6. Cornice and Exterior Trim		100	100
7. Roofing		30	30
8. Interior Trim		125	125
9. Cabinet Work		85	85
10. Stair Construction		50	50
11. Review and Evaluation	25	40	65
Totals in Hours	540	540	1,080

This example is taken from a situation in which the class meets for 3 hours a day, for 180 days of instruction each school year. Each teaching situation will have available a certain amount of time for instruction. In some nations, or in some schools, the time available may be greater than in this example and in others it may be less. Adjustments must be made in both the content and in the time allotment to fit the local conditions.

The important element of the section, The Course of Study, and of the exercise is to learn how to PIAN for INSTRUCTION. A process for planning has been presented which, if followed, will im-

4. ibid., p. 34.

prove instruction through the selection of relevant curriculum materials which meet the needs and abilities of the students as well as meet the requirements of the course.

Exercise:

1. Using the list of instructional units prepared for the previous exercise, place them in a logical-teachable sequence.
2. Review each unit to be certain that there is a defendable rationale for its inclusion.
3. Estimate the time required to teach each unit.
4. Prepare a chart similar to the example used in this section.
5. Does the total time required for instruction equal the length of time specified in the course description?
6. Revise as necessary.

SAMPLE UNIT PLAN

Following is a sample format for a unit of instruction. This format may be used as a model in dividing the content into teachable related segments of the course in question. The source of the model is Develop a Unit of Instruction.[5]

UNIT PLAN

Unit Title_____

Subject (Course)_____

School_____Teacher_____ Date_____

I Overview

Prepare a brief statement of the purpose of the unit.

II Topics to be covered

List the topics to be covered in the unit. Note that each topic may require one or more lesson plans.

III Student performance objectives

State exactly what it is you expect the student to be able to do upon completion of the unit. Note the following examples.

"The student will be able to...

-orally explain the basic principles of operation of each of the following:

a. Diesel engine
b. Wankel engine
c. Steam engine
d. Gas turbine

-draw a simple sketch of roof construction.

5. Develop a Unit of Instruction, Module B-3, The National Center for Research in Vocational Education, Ohio State University, Columbus, Ohio, 1977, p. 38, Teacher Ed. Module Series.

IV Student learning activities — Required resources

List the activities	List after each activity
Draw or sketch--	the resources needed.
Listen to--	These resources pertain
Disassemble--	only to the learning
Construct--	activity.

V Student evaluation

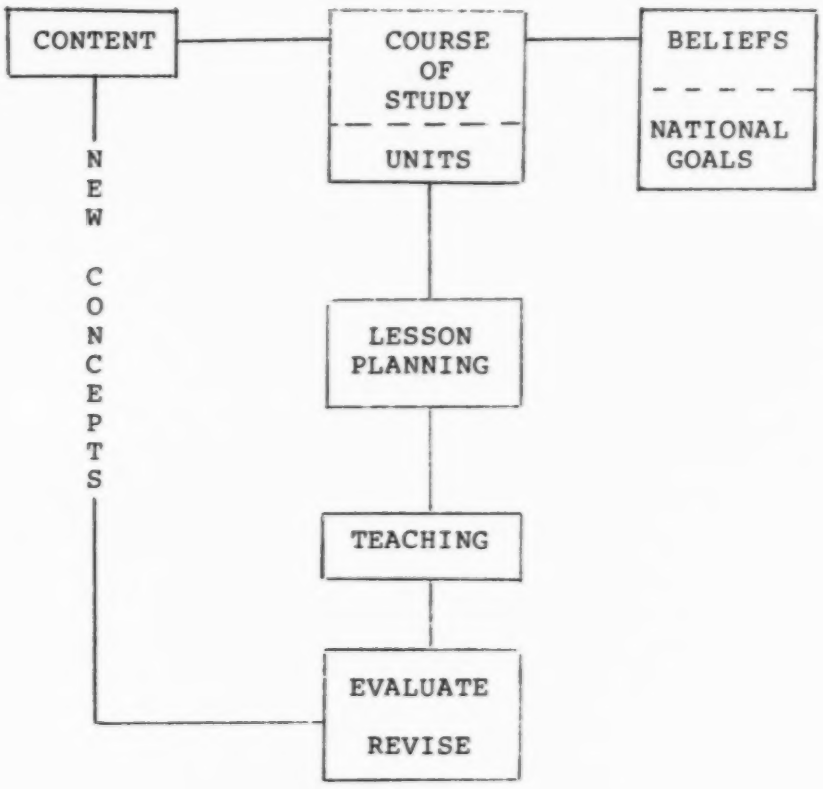
Describe the method to be used to determine the learning that has taken place.

VI Resource materials

List any not included under item IV above.

DEVELOPING A LESSON PLAN

Up to this point in this series of exercises a great deal of thought and attention has been given to certain parts of preparing to teach Industrial Education subjects. Content, personal beliefs, aims and goals of the school and nation have been brought together in a course of study. The course of study has been sequenced and timed. The next step on which to focus is that of lesson planning. This step brings together previous experiences in Industrial Arts Education plus learning/knowledge from other classes; for example, Methods of Teaching and Psychology. Following is a schematic view of the process.



The next step is to prepare the lesson plans. Daily lesson plan-

ning is extremely important when teaching in any subject area. The rationale for a lesson plan is:

1. It encourages and provides for the setting of objectives.
2. It focuses on the essential and relevant content.
3. It aids in planning for the needed tools, equipment, and other resources which are essential to the teaching of the lesson.
4. It provides for the planning of both teacher and student learning activities.
5. It provides for the timing of the lesson.
6. It provides for evaluation and revision.

In short, it is the guide that takes the teacher from the introduction of the lesson through its evaluation.

The purpose of this exercise is to provide an opportunity to apply previous learning/knowledge and experience in the preparation of lesson plans designed for use in Industrial Education/Vocational Education teaching. In preparing to teach industrial/vocational subjects the teacher is basically adding one more dimension to teaching--that of teaching a job entry-level skill.

The skill development lesson plan differs from an informational lesson plan in the type of teacher/student activity and resources (tools, equipment and materials) required for teaching the lesson. The informational lesson plan is designed for the teaching of information and for the teaching of ways in which that knowledge is used. The skill development lesson plan is designed for the teaching of job, craft, or trade related skills. These skills are normally at the "job entry-level." The skill development lesson plan includes information relevant to the lesson or

skill being taught. Following is a sample lesson plan for skill development. Explanatory notes follow the sample.

SKILL DEVELOPMENT LESSON PLAN

Course of Study:_____ Unit:_____

Task, job, or operation: See Note #1

Objective(s)

The student will

Skill: See Note #2

Knowledge: See Note #2

Attitude: See Note #3

Content: See Note #4

Tools: 1. 3. See Note #5 5.

2. 4. 6.

Equipment: 1. See Note #5

Materials: 1. 3. See Note #5 5.

2. 4. 6.

Teaching Aids: See Note #6

Introduction: Time:_____Minutes

See Note #7

Skill Demonstration: Time:_____Minutes

See Note #8

Practical Application: Time:_____Minutes

(Teacher) See Note #9

(Student)

Evaluation: Time:_____Minutes

See Note #10

Further Study, Practice, or Observation:

See Note #11

Personal Evaluation of the Lesson:

See Note #12

Lesson Plan Explanatory Notes

Note #1 This statement should be brief and exact. It might be for example, "Estimating the cost of materials" or "The operation and maintenance of a power hack saw."

Note #2 State in terms of what the learner will be able to do and what the learner will know.

Be specific.

Relate to overall course objectives.

In general not more than 2 objectives will be required. If more are required consider dividing the content into two or more lessons.

Note #3 May not apply in every situation.

However, in each lesson emphasize action, a positive attitude toward safe practices, cooperation, conservation of materials, and so on and, as a reminder, an objective may be inserted.

Note #4 Include main points.

Relate to objectives.

List or explain sub-points for each main point.

Note #5 List individual tools, sets, or equipment items.

Include accessories needed in the demonstration.

List materials: kind, size, number of pieces, etc.

Note #6 Examples are charts, maps, models, films, pictures, slides.

Does any aid have to be constructed? If so, describe what it is that must be done.

Note #7 Describe the motivating technique to be used.

How will you gain the interest of the student?

How will you relate the lesson to previous learning and experience?

Provide an overview of the lesson objectives--in the frame of reference of the student.

How much time will it take for motivation?

Note #8 List each step.

State the points of emphasis (standards, safety, and technique) under each step.

Note #9 Describe the teacher activity.

Describe the student activity.

Will the student work alone? In pairs? Small groups?

How much time is allotted teacher activity and for student practice?

Note #10 How? State method. (Performance, observation, test, or other means of measuring student learning).

List points to be included in evaluation.

How will you use the results of the evaluation to identify students in need of extra help?

State how you will know whether or not the objectives of the lesson have been met.

How much time is allowed for evaluation?

Note #11 What additional work is expected of the students? If none, state.

Provide the source and state in specific terms just what is expected of the student.

If a handout (information sheet, operations sheet, or other material) is required, make note of that fact and describe it.

Note #12 List both the strong and the weak points of the lesson.

Make the necessary changes in the lesson.

Cannot be completed until the lesson has been taught.

You may wish to do this on a separate sheet of paper.

Exercise:

1. Study the Skill Development Lesson Plan model.
2. Select a lesson from a unit in the course of study you have just completed, or from the syllabus you will be using.

3. Using the model provided, prepare a lesson plan.

When you have completed the lesson plan, set it aside for no more than a day, then read it through again as though you would be teaching the lesson in a short time. Be your own critic. Does each element of the lesson belong? Does each element belong in the sequence you have placed it? Does the timing seem realistic? Is the content complete? Does the evaluation method match/measure the objectives? Finally, make the necessary changes.

Lesson planning is a demanding task, one in which you will be involved as long as you teach. The method in which you plan will, no doubt, change with experience; it may become easier, but it will not become less important. The model presented for this exercise is a demanding one and is intended to force thought on all aspects of the lesson. Your success, or failure, as a teacher depends to a very large extent on the quality of your planning for instruction.

PROJECT SELECTION IN INDUSTRIAL ARTS

Industrial Arts is a study of tools, materials, and processes found in the various industries and crafts of a nation, with specific emphasis on the locale or area in which the teaching takes place. Thus, if certain processes or special kinds of wood, clay, stone, coral, shells or fiber are found locally these should be used along with the more internationally used kinds of materials. An important consideration in the selection of a project is the availability and cost of materials. The use of local or native materials is of special importance in the development of the crafts industry. The Industrial Arts project, when properly used, can become the basis for a growing crafts industry.

The making of a "nice" project is not the goal, objective, or purpose of the course. The project is simply the vehicle that is used in the teaching of Industrial Arts. It is the practical "doing" activity of the laboratory or shop intended to reinforce learning and, yes, to teach appreciation for and the use of tools and of equipment.

The student is the teacher's project. The acquisition of skill, knowledge, and a positive attitude is the student's project. The article made is a by-product of instruction.

Following are 5 basic purposes of the project. The project is used:

1. to teach respect for craftsmanship. This respect must include design, construction and finishing. Any one of

these done improperly results in a poorly done project; more importantly, it shows a lack of respect for craftsmanship.

2. for problem solving. The instructor can pose any number of problems and ask the students to come up with solutions which involve and require design, construction, and/or finishing processes.

3. as a means of experimentation with local materials. Some of the more advanced students will be able to combine the problem solving aspect with the experimentation aspect of Industrial Arts.

4. to teach the rudiments of construction (tool and equipment usage along with methods of fabrication) necessary to pass the various examinations, of which the CXC (Caribbean Examination Council) is an example. This does not negate, however, the need to include problem solving and experimentation in the course.

5. to teach the proper and safe use of tools.

The selection of the project(s) to be used as a vehicle for instruction is of utmost importance. It is used to convey skill and knowledge to the learner as its primary responsibility. The project becomes the evidence of things learned, and as such speaks for both the instructor and the learner.

There are basic criteria for project selection. The list of criteria below will serve as a basis for project selection. As you consider the project for your teaching, you may wish to expand this list. The project:

1. must fulfill the objectives of the course;

2. must be based on the learner's previous experience, ability and knowledge;

3. must be at a level of difficulty which will challenge, yet will not discourage the student;

4. must use construction practices (joints, fasteners, etc.) as they are found and used in industry;

5. should provide for the student's creativity in design or project selection;

6. must use principles (artistic) of good design;

7. must be designed for economical use of materials;

8. must take into account the availability of materials;

9. must be designed for the simplest method of construction;

10. should require the learning of skills transferable to out of school tasks (employment);

11. should be useful and/or decorative;

12. should be capable of completion in the time available.

Notes to the Instructor

The instructor is the model, the person who must set the example for students in excellence in craftsmanship, correct and safe tool usage, appropriate method of construction, correct and suitable finishes, selection of material, conservation of materials, and the list goes on. Therefore, it is important that the instructor:

1. make a model of a typical project to demonstrate both the finished product and any particularly difficult construction problem. This should be done with each new group of students. It is a good way of showing students how to do each process and it is, then, your demonstration project.

2. continually circulate among students as they are working on their projects to give over the shoulder help and encouragement. This technique is as important during the finishing processes as in the construction phase.

3. should keep personal projects to a minimum as these tend to take time away from teaching and from the preparation for teaching which is the only reason for having an Industrial Arts laboratory in the first place. Any activity which in any way detracts from teaching is out of place.

Exercise:

1. Select and design a project suitable for a class in woodworking or metalworking that will meet the requirements of the Basic Proficiency level of the CXC Syllabus.
   Note: If you are not teaching in a situation where the CXC Syllabus is in use then specify the grade level and design the project for that group of students.

2. List the ways in which the project meets the criteria found under project selection.

3. Construct the project.

4. Evaluate the project and make any alterations necessary.

PROGRAM IMPROVEMENT: A CHECK SHEET

Following is a list of criteria statements. They are listed at random and are intended to cause thinking about various facets of your program of instruction.

As you evaluate your program think in terms of what "might be" not just about what is.

As you review your program, check each statement with a 1 or a 2; a 1 meaning that, for now, it is very good and a 2 meaning that it needs upgrading. Use a red number 2 for emergency items.

After reviewing your program make a list of all items checked with a 2 on a separate sheet of paper. Then review this list and make a list of priority items on which you will begin the improvement process.

An excellent program is one which:

____meets the needs of Caribbean business, industry and labour;

____meets the needs of Caribbean students;

____blends theory and practice into a unified whole course of study;

____makes Math, Science and English work for the student, not the reverse;

____stresses the interrelatedness of learning;

____does not accept shoddy craftsmanship;

____meets industry standards for equipment;

____balances instructional subject areas with opportunities for employment;

____receives input from business, industry, labour and government;

____brings the learner and the practitioner of a craft or skill in contact with each other and with potential employers;

____stresses curriculum review and revision on a regular basis;

____is flexible enough to meet changes in industrial processes, business procedures and use of materials;

____is capable of adjusting to changes in employment trends;

____is part of a broad based curriculum leading from exploration to selection of an area for in-depth study;

____leads to and prepares students for further study;

____stresses the individual learner and her/his progress;

____stresses problem solving over rote learning;

____emphasizes care and maintenance of all tools, equipment and facilities;

____causes every instructor to extend her/himself in further study;

____has every instructor in class and ready to teach for the entire class period;

____has an instructional staff that uses current/effective teaching methods;

____stresses pride in achievement and dignity to those who achieve;

____encourages communication between teachers of all subjects as well as between teachers of similar subjects;

____encourages membership in professional education associations;

____stresses creative thinking by both students and teachers;

____has adequate library resources for further study by students and teachers.

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★ U.S. Government Printing Office: 1985—622-499/00341

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